

## **REMARKS**

The present Amendment is in response to the Examiner's Office Action mailed October 5, 2004. Claims 15 and 17-46 are cancelled, claims 2 and 4 are amended, and new claims 47-51 are added. Claims 1-14 and 47-51 are now pending in view of the above amendments.

Reconsideration of the application is respectfully requested in view of the above amendments to the claims and the following remarks. For the Examiner's convenience and reference, Applicant's remarks are presented in the order in which the corresponding issues were raised in the Office Action.

Please note that the following remarks are not intended to be an exhaustive enumeration of the distinctions between any cited references and the claimed invention. Rather, the distinctions identified and discussed below are presented solely by way of example to illustrate some of the differences between the claimed invention and the cited references. In addition, Applicants request that the Examiner carefully review any references discussed below to ensure that Applicants understanding and discussion of the references, if any, is consistent with the Examiner's understanding.

### **I. Rejection Under 35 U.S.C. §102(b)**

The Examiner rejects claims 1-5, 10-15, 17-19, and 24-32 under 35 U.S.C. § 102(b) as being anticipated by *Johnson* (United States Patent No. 6,064,683). Initially, claims 15, 17-19, and 24-32 have been cancelled, rendering the rejection of these claims moot. Applicants respectfully traverse the rejection of the remaining claims 1-14 because *Johnson* does not teach or suggest each and every element of these claims in view of the following remarks.

*Johnson* teaches a method of forming a VCSEL as follows:

To make device 56, a lower n-mirror 58 along with an active region 64 and a reduced upper mirror 68 are grown. Reduced upper mirror 68 can end in a thin contact layer. Grown p-n junction 88 can be very near the quantum wells in wider gap material or even in the quantum well region 64. High contrast dielectric mirror 90 layers are deposited with a sacrificial layer 92 on top. Dielectric mirror stack 90 is patterned and used as a Be implant 82 mask. Resist is left on stack 90 for the implant if needed. The Be must go through active region 64 on into spacer 62, but stop significantly before the low gap material mirror 58 layers. Implant 82 does not reach the center of active region 80, because of the sacrificial layer

92 masking on dielectric stack 90. The etch of dielectric stack 90 may have a negative slope to enhance liftoff of layer 93.

*Johnson* at column 7, lines 37-55.

As described in the above quoted text from *Johnson*, the dielectric mirror 90 is deposited on the underlying reduced upper mirror or contact layer. The deposited dielectric mirror 90 is then patterned to a shape that is used as a Be implant mask.

In direct contrast, claim 1 recites, *inter alia*: “wherein the method of forming the dielectric mirror comprises: depositing a photoresist on said epitaxially grown layers; patterning said photoresist to form an aperture area; depositing a dielectric material on said patterned photoresist; depositing a liftoff layer on said dielectric material; and removing portions of said dielectric material and liftoff layer that border said aperture area.”

In other words, *Johnson* teaches a method that involves depositing and then patterning a dielectric mirror. Present claim 1 deposits a photoresist which is then patterned. The dielectric mirror in claim 1 is deposited on the patterned photoresist and then a liftoff technique is used to remove the unwanted portions of the dielectric mirror. Hence, *Johnson*’s methods do not teach the presently claimed method of claim 1.

The significance of this limitation in this embodiment of the invention can be found, in part, in the application as filed at page 3, lines 6-11 as well as at page 1, lines 19-27. Particularly, the claimed method and the method disclosed by *Johnson* are not merely different approaches at achieving an end structure. Rather, the inventive embodiment as recited in claim 1 achieves a narrow dielectric layer “in such a manner that the extent of the dielectric mirror is never larger than the laser aperture during fabrication.” In other words, the recited process of depositing a photoresist before depositing the dielectric material enables the dielectric layer to only contact the underlying layers at the aperture. The claimed method thus reduces the strain that a dielectric mirror places on underlying layers due to their differing coefficients of thermal expansion. In contrast, although *Johnson*’s methods may only place the dielectric mirror on the underlying layers for a brief time during fabrication, this still creates an undesirable strain on the device. See Specification at page 3, lines 10-11.

For at least these foregoing reasons, claims 2-5 and 10-14, which depend from claim 1, are also not anticipated by *Johnson*.

Since *Johnson* does not teach the methods recited in present claims 1-14, Applicants respectfully request that the rejection under 35 U.S.C. § 102(b) be withdrawn.

## II. Rejection Under 35 U.S.C. § 103

The Examiner rejects claims 6-9, 20-23, and 39-42 under 35 U.S.C. § 103 as being unpatentable over *Johnson* in view of *Sun* (U.S. Patent No. 6,185,241). Initially, claims 20-23 and 39-42 have been cancelled, rendering the rejection of these claims moot.

Applicants traverse the Examiner's foregoing rejections of claims 6-9 for obviousness on the grounds that the references – either individually or in combination – fail to teach or suggest each and every element of the rejected claims. With regard to claim 1, from which claims 6-9 depend, by contrast to the presently claimed invention, and as previously noted, *Johnson* does not teach or suggest “wherein the method of forming the dielectric mirror comprises: depositing a photoresist on said epitaxially grown layers; patterning said photoresist to form an aperture area; depositing a dielectric material on said patterned photoresist; depositing a liftoff layer on said dielectric material; and removing portions of said dielectric material and liftoff layer that border said aperture area,” as is presently claimed in claim 1. Rather, although *Johnson* teaches depositing a dielectric mirror 90 on an underlying reduced upper mirror or contact layer and then patterning the deposited dielectric mirror 90 to a shape that is used as a Be implant mask (See column 7, lines 37-55), *Johnson* does not teach or suggest the liftoff method as is claimed. *Sun* cannot cure this failure of *Johnson* in that *Sun* also does not teach or suggest the claimed method.

In view of *Johnson* and *Sun*'s failure to teach the claimed methods, Applicants submit that the Examiner has failed to set forth a *prima facie* case for obviousness with respect to claims 6-9 and respectfully request that the rejection be withdrawn.

The Examiner rejects claims 33-38 and 43-46 under 35 U.S.C. § 103 as being unpatentable over *Johnson* in view of the *Lott et al.* article. However, claims 33-38 and 43-46 have been cancelled, rendering the rejection of these claims moot.

## C. New Claims 47-51

Applicant respectfully submits that, consistent with the discussion presented herein, new claims 47-52 are patentably distinct from the methods disclosed in the references cited by the Examiner. In this connection, Applicant respectfully submits that patentability of Applicant's

new claim does not hinge on the presence of any particular limitation(s). Rather, Applicant respectfully submits that each of the now pending claims, considered in its respective entirety, patentably distinguishes over the references cited by the Examiner.

### **CONCLUSION**

In view of the foregoing, Applicants believe the claims as amended are in allowable form. In the event that the Examiner finds remaining impediment to a prompt allowance of this application that may be clarified through a telephone interview, or which may be overcome by an Examiner's Amendment, the Examiner is requested to contact the undersigned attorney.

Dated this 7th day of February, 2005.

Respectfully submitted,



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